Software and Knowledge Engineering (International Program)

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01219141   Object-Oriented Modeling and Programming   3 (3-0)

Object concepts, object-oriented design and analysis, object-oriented analysis relating to developing conceptual models of the problem domain of a software product, object-oriented design relating to developing models of the software solution to the problem clarified during analysis, constructing programs that implement models, evaluation and improvement of object-oriented models and code, languages and tools for developing models and programming.

01219142   Object-Oriented Modeling and Programming Laboratory   1 (0-3)

Prerequisite : 01219141 or together

Laboratory for 219141 Object-Oriented Modeling and Programming.

01219211   Software Development Training Camp   1 (0-3)

Prerequisite : 01204214

Program development skill enhancement camp, at least 48 person-hours.

01219221   Computer Organization and Architecture   3 (3-0)

Basic computer organization and architecture, registers, arithmetic-logic unit, control unit, machine representation of data and instructions, machine language, assembly language, input/output system, computer evolution, CPU architecture, instruction sets, ALU design, hardwired and microprogrammed control, memory hierarchies, virtual memory, cache memory.

01219243   Software Specification and Design   3 (3-0)

Prerequisite : 01219141

Development of software specifications; architecture and desing of software analysis; architecture; design patterns; architecture design and detailed design.

01219244   Software Specification and Design Laboratory   1 (0-3)

Prerequisite : 01219243 or together

Laboratory for 219243 Software Specification and Design.

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01219245   Individual Software Development Process   3 (3-0)

     Prerequisite : 01219141

     Software development process, time management, tracking time, period and production planning, managing personal time, commitments and schedules, project plan, finding defects, code review checklist, projecting defects, economics of defect removal, design defects, product quality, process and personal commitment to quality.

01219246   Individual Software Development Process Laboratory   1 (0-3)

     Prerequisite : 01219245 or together

     Laboratory for 219245 Individual Software Development Process.

01219271   Knowledge Engineering and Knowledge Management   3 (3-0)

     Knowledge characteristics, concept, and process of knowledge acquisition, knowledge sources architecture of knowledge-based system, knowledge engineering tools, learning and performance in the knowledge economy, knowledge cycle, varieties of knowledge work, knowledge management opportunities in large enterprise, mechanics of knowledge management, relations between organizational culture and knowledge management.

01219311   Operating Systems for Software and Knowledge Engineer   3 (3-0)

     Prerequisite : 01219141

     Basic concepts of interfacing between large-scale software and operating systems, software and hardware interfacing, process management and scheduling, input/output management, memory management, file systems, computer system security.

01219321   Data Communication and Computers Networks Programming   3 (3-0)

     Data communication network; data transmission; data link controls; local area network and wide area network; communication architecture and protocols; service-oriented programming.

01219322   Electronic Commerce Engineering   3 (3-0)

     Electronic commerce technology, Electronic commerce system development and implementation, networking technologies and their future directions, database technologies, database-web connectivity, security-related issues, electronic payment systems, business intelligence, trust management, trading agents, privacy, information products and copy protection, digital divide.

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01219331   Database Design and Programming   3 (3-0)

Characteristics of information systems, data storage techniques, data manipulation and searching services, information retrieval techniques, principles of database systems and database management, entities and relations, data normalization, data definition languages and data manipulation languages, interfacing between applications and database, programming in database management systems.

01219332   Data Warehouse   3 (3-0)

Fundamentals of data warehousing, project planning, business requirement definition, dimensional modeling, technical architecture, physical configuration options, project selection, physical database design, data staging process, data staging techniques, target user applications, deployment of data warehouse, system growth management.

01219333   Introduction to Data Mining   3 (3-0)

Basic concepts of data mining, data mining applications, techniques and models, ethics and privacy issues, data mining software suite, data mining methodologies, decision tables, decision trees, classification rules, clustering, statistical modeling, and linear models.

01219334   Transaction Processing   3 (3-0)

Transactions and their properties, resource managers and transaction managers, transaction processing models, benefits of using transactional versus non-transactional communications, applications that process transactions via the Web, transaction processing monitor, electronic payment transaction, server side applications, transaction services, currently deployed transaction servers.

01219347   Workgroup Software Development Process   3 (3-0)
Prerequisite : 01219245 and/or together 01219243

Concept of workgroup, logic of workgroup software process, development strategy, development plan, defining the requirements, role of reader, development manager, design, implementation and system testing by workgroup, Leader role of team development manager role, planning manager role, quality and process manager, and support manager role.

01219348   Workgroup Software Development Process Laboratory   1 (0-3)
Prerequisite : 01219347 or together

Laboratory for 219347 Workgroup Software Development Process

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01219361 Decision Support System   **3 (3-0)**

Management support systems, decision making process, characteristics and components of decision support system, modeling and model management, group decision support system.

01219362 Machine Learning   **3 (3-0)**

Techniques and algorithms underlying machine learning, inductive process of decision trees, parametric-based Bayesian learning approach, hidden Markov models, non-parametric methods, discriminant functions, neural networks, stochastic methods, genetic algorithms, unsupervised learning, data clustering.

01219363 Knowledge Representation   **3 (3-0)**

Knowledge representation and its reasoning tasks, basic principle of knowledge representation, advantage and limitations of rule-based systems, frame-based systems and logic-based systems; predicate calculus; semantic networks; ontology of knowledge representation; fuzzy representation.

01219364 Knowledge Discovery   **3 (3-0)**
            Prerequisite : 01219271

Principles of knowledge discovery, automated scientific discovery, inductive reasoning, knowledge discovery processes, knowledge mining algorithms and tools.

01219371 Information Technology for Managing Knowledge   **3 (3-0)**

Traditional information processing systems; the development of information systems; management information systems and information technology for knowledge management; information technology for knowledge development; information technology for knowledge storage; search engines; searching algorithms and methodologies; knowledge representation; artificial intelligence and knowledge management; knowledge management applications.

01219372 Enterprise Management in Software and Knowledge Business   **3 (3-0)**

Principles of management, concept on administration and management, characteristics of software business, organizational behavior, personnel management, office management, wage and salary management, resource management , software business management, information technology market and business, business policies, software business project evaluation.

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01219373   Innovation Management   3 (3-0)

        Definition and types of technological innovation, characteristics and innovation management, paradigm shifts in innovation theory and process models, malfunctions in managing an innovation process, strategic and operative conditions facilitating innovation, dynamics of linking innovation strategies to technology cycles and managing innovation streams, implementing innovation strategies through business process redesign, managing knowledge in the organization and motivating human creativity, innovation networks and strategic technology alliances, benchmarking innovation efficiency.

01219381   Multimedia Data Engineering   3 (3-0)

        Multimedia systems technology, data formats and standards, compression standards, input/output and storage technologies, user interface, multimedia database, multimedia communications, and distributed multimedia systems.

01219411   Computer Systems Security   3 (3-0)

        Computer security, as access control, authentication, authorization, cryptography, system safety, system backup and recovery, security policies.

01219449   Software Patterns and Architecture   3 (3-0)

        Software architecture process, software quality attributes, software architecture documentation, model-driven architecture, service-oriented architecture, architectural design patterns, concurrent and networked object patterns, enterprise system patterns, internet-based system patterns.

01219451   Web Services Technology   3 (3-0)

        Problems in analyzing and designing web applications from small-scale to large-scale; enterprise applications; applications distributed across corporate intranets, extranets, and internet; web standard protocols and interfaces; web security; web engineering methodology; web architectures and web components; electronic-commerce infrastructures; database and web integration; web services standards and technologies; web-based application development.

01219481   Multimedia Content Analysis   3 (3-0)

        Fundamental concepts, theories and algorithms for pattern recognition of multimedia data, computer vision, signal processing, speech recognition, multimedia feature extraction, Bayes decision theory, parametric and non-parametric learning, dimension reduction, characteristics of important contents of multimedia data.

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01219482 Hypermedia Presentation   3 (3-0)

Hypermedia technology, graphic presentation, animation, video image, audio, perception psychology, multimedia presentation techniques, hypermedia-linked information, presentation design, advertisement, public announcement, hypermedia presentation on the web and Internet.

01219483 Digital Arts   3 (3-0)

Hardware component for graphic systems, fonts, icons, black-white graphic, gray-scale graphic, interactive graphic, line drawing, curve drawing, two-dimensional transformation, clipping, raster and vector, three-dimensional graphic, surface, three-dimensional transformation, hidden surface removal, shading and shadowing, graphic file standard, moving picture creation, applications of digital arts in advertising and video games.

01219490 Co-operative Education   9

Co-opertive training with at least 1000 workhours.

01219491 Introduction to Research Methods in Software and Knowledge Engineering   3 (3-0)

Research in software and knowledge engineering, characteristics of software and knowledge engineering research, research proposal preparation, data gathering and information retrieval, experiment tools in software and knowledge engineering, data analysis, technical report writing.

01219495 Software and Knowledge Engineering Individual Project   3 (3-0)

Individual project on interesting topic in software and knowledge engineering.

01219496 Selected Topics in Software and Knowledge Engineering   3 (3-0)

Selected topics in software and knowledge engineering at the bachelor degree level, topics are subject to change each semester.

01219497 Seminar   1

Presentation and discussion on interesting topics in software and knowledge engineering at the bachelor's degree level.

01219498 Special Problems   1-3

Study and research in software and knowledge engineering at the bachelor degree level and compile into a written report.

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01219499   Innovative Software Group Project   3 (2-3)
            Prerequisite : 01219490

        Long-term workgroup project on production and development of innovative tools for software and knowledge engineering.